DOCUMENT RESUME

ED 417 184 SP 037 831

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TITLE The Role of New Information Technologies in Facilitating Professional Reflective Practice across the Supervisory Triad.
PUB DATE 1997-12-00
NOTE 13p.; Paper presented at the Annual Conference of the gasat-IOSTE (Perth, Western Australia, December 5-8, 1997).
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Uses in Education; Cooperating Teachers; *Educational Technology; Foreign Countries; Higher Education; Preservice Teacher Education; *Reflective Teaching; Rural Schools; Secondary Education; Student Teacher Supervisors; Student Teachers
IDENTIFIERS Australia; *Instructional Information Systems; *Instructional Management Systems; Reflective Thinking

ABSTRACT

This study investigated the role of new information management technologies in facilitating student teacher supervision across the supervisory triad of student teacher, cooperating teacher, and university supervisor. The study investigated how data routinely generated by teachers and stored within an Instructional Information Management System (IIMS) was contemplated by student teachers and their supervisors in promoting reflective practice. Four secondary student teachers participated. The Remote Area Practicum Supervision Project occurred over 1 semester. It was designed to evaluate the potential of new information technologies and the implications of these technologies for new ways to conduct preservice teacher practicums. An IIMS was networked within a remote school and linked to the university to share information across both sites. The student teachers and their university supervisors and cooperating teachers received extensive training in the IIMS before and during the practicum. Student teachers were supervised remotely by university supervisors using modern communications and computer technologies, and directly by cooperating teachers in the remote school, making use of available technology. Data from participant interviews and documentation of student teachers' and university supervisors' personal reflections on the experience indicated that the congruence of various new information technologies, appropriately applied to support practicum experiences, enriched the experiences of everyone involved. The project supported development of more collegially based practices and sharing of practical knowledge and wisdom to enrich education. (Contains 18 references.) (SM)

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ED 417 184

The Role of New Information Technologies in Facilitating Professional Reflective Practice across the Supervisory Triad

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Perth: Western Australia
December 5th. - 8th

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SB 378831

THE ROLE OF NEW INFORMATION TECHNOLOGIES IN FACILITATING PROFESSIONAL REFLECTIVE PRACTICE ACROSS THE SUPERVISORY TRIAD

ABSTRACT

Central to some of the problems encountered in various approaches to the practicum are those associated with the roles of supervisors, their responsibilities and the nature and forms of communication across the supervisory triad. The latter involves university supervisor, school cooperating teacher and student teacher. Another problematic area is concerned with developing and promoting reflective practice. In this study new information management technologies were used, and their effectiveness evaluated, in facilitating the supervisory process irrespective of time and place. Also, in information rich environments, to investigate how data routinely generated by teachers, and stored within an Instructional Information Management System (IIMS), might be contemplated by student teachers and their supervisors in promoting reflective practice. It was found that the congruence of a number of new information technologies, appropriately applied to support practicum experiences, can enrich the experiences of student teachers and their supervisors. All participants in the supervisory triad require specialised training in the use of new IT for the purpose of practicum supervision if its potential is to be fully realised. Difficulties in developing an appropriate electronic infrastructure in the school setting are reported.

New technologies construct a totally new environment and this radically alters the way we use our senses and thus the way we act and react to things. On this basis, the restructuring that necessarily occurs as a consequence of introducing new technology enters practically every facet of our lives. Changes come, therefore, because of the application of new technologies, and it does not matter so much about the details of the content. The inevitable transition to computer-supported learning contexts offers major challenges and new opportunities for pedagogy and curriculum, potentially enabling us to break the lock of structures and the inertia of tradition that we have tended to think of as givens, when introducing changes into our education systems.

High sounding rhetoric? Whether this is actually the perceived situation for many practitioners, immersed as they are in the daily round of schools and life in contemporary classrooms, is likely to be something of a moot point. Nevertheless the potential to do things differently by 'working smarter' using new information management tools has already been realised in many areas of human endeavour. Until recently, however, the 'take up' of integrated productivity tools in education, on a scale that is likely to have a noticeable impact, has tended to lag behind other social systems. While this situation is starting to change at the school level, the impact of new technology behind the classroom door is still minimal except for pockets of exemplary practice (Carter, Connors and Kelly, 1997)

Research into the use of new technologies in teacher education is at an embryonic stage (Harrington and Hathaway, 1994). The research reported to date has tended to focus on conferencing and the use of electronic mail to promote critical reflective practice and ways of communicating (Burlbaw, 1993; Harrington and Hathaway, 1994). The issue which Harrington (1993) raises is that it is necessary for us to examine our use of new technologies to "determine if our incorporation of technology enhances or undermines our intentions" (p. 5).

In Harrington (1993) and Burlbaw's (1993;1994) studies with computer conferencing, apparently the use of conferencing actually led to a change from an individualistic style of

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learning towards a more communal approach which allows time to reflect on other people's perspectives (Harrington, 1993, p. 10). Unlike the Learning Tool which Harrington investigated, an Instructional Information Management System (IIMS) uses relational data base technology designed specifically to allow for the unobtrusive acquistion of data describing the core operations of curriculum: teaching and learning and assessment. This is in order that *inter alia* assessment articulates with purpose and the intervening curricular processes are rendered transparent. The IIMS provides an implicit means of providing opportunities for teachers to become students of their own practice, using information they routinely generate, but now captured and stored in a form that makes it easily available for contemplation and further analysis.

One of the most valuable uses for new technologies is in the support of teachers in rural or remote areas who are often isolated from peers and lack support in their professional life (Jinks, 1990). Jinks notes that the problem lies in the "delivery, not of demonstrating that rural teachers can learn from instruction" (p. 130). Jinks asserts that telecommunications technologies can be very effective in responding to problems, but that "support frameworks" must also be present (p. 131). The study reported here examined ways in which teacher education students could be supported in a remote locale but this example could easily be transferred to beginning teachers in any isolated situation, or any teacher for that matter, who requires some professional dialogue, sense of collegiality or support.

Lastly, the use of new information technology systems, like IIMSs, may radically alter the beliefs and attitudes present in many schools today. Attitudes which promote "norms of independepnce and privacy" and where there is "no substantial body of shared and handed-down wisdom about teaching, the means to accumulate it, or the means to transmit it to novices" (Bird and Little, 1986).

REFLECTIVE PRACTICE CONSIDERATIONS

Teaching and other practical experiences are those experiences which allow teacher education students to develop and achieve competence in the practical skills, knowledge and attitudes necessary for operating as competent autonomous teachers. Such experiences should be designed to allow for the professional and personal growth of teacher education students. They should also be designed to ensure that teacher education students adopt a critically reflective rather than a reproductive approach to their professional growth as teachers (p. 12).

Critical self-reflection is defined by Harrignton and Hathaway (1994) as being

> ... capable of self-criticism...[the ability to] reason at complex levels and gain greater access to their own reasoning processes...identify weaknesses in their own thinking...[be] more flexible in the application of knowledge...identify their own assumptions about that knowledge...change from a focus on self to a focus on universal ethical principles when making moral decisions (p. 544)

Schon (1983) advocates the 'reflection-in-action' model which can be "rigorous in its own right, and links the art of practice in uncertainty and uniqueness to the scientist's art of research" (p. 69). The reflective supervision can "help teachers elaborate and refine their own practical theories about teaching" (Schon, in Zeichner, 1990). However, the envrionment and opportunity to practice such reflection must be inherent in the experience (Turney, *et al*, 1985). If reflection is an admirable process and an ideal to which the student teacher aims, then a framework must exist for student teachers to be provided with the opportunity and experience to effect this reflection. Schlagal, Trathen and Blanton (1996), believe that "a way to address this is to make the students full participants with teachers, university supervisors and their peers" in a conference-like situation which they call a "community of discourse" (p. 176).

However, a "community of discourse" can only occur when certain factors are accounted for. These factors include "non-dominated dialogue", developing "norms of collegiality", "joint problem solving" and the inclusion of the "perspectives of multiple educational constituencies" (Harrington and Hathaway, 1994, p. 545). Both Harrington and Hathaway (1994) and Schlagal, Trathen and Blanton (1996) suggest new technologies via conferencing as a means of encouraging reflective discourse whilst overcoming the associated problems inherent in such procedures. Later, we examine these suggestions in light of the emerging technologies trialled in the remote area practicum supervision project.

PROBLEMS OF THE PRACTICUM

Zeichner (1990) identifies six key 'problems' with the traditional practicum where student teachers are placed with a co-operating teacher in a school, with short weekly visits from the university supervisor and are left little time for reflection on the process (Boydell, 1986; Thomas, Clift and Sugimoto, 1996; Ritz, Cashell and Felsen, 1981; Schlagal, Trathen and Blanton, 1996; Turney et al, 1985; Zeichner, 1990). Most researchers have identified that the practicum is necessary (May and Zimpher, 1986) but there seem to be some serious problems with the practicum itself. Zeichner (1990) suggests the problem lies in the "bulk of supervision left to on-school co-operating teachers" (p. 129). Boydell (1986) discusses evidence which "raises serious implications for the traditional types of teaching practicum supervision" (p. 138) and both Boothroyd (in Boydell, 1986) and Ritz, Cashell and Felsen (1981) note the sometimes dramatic difference between student teacher and supervisor perceptions of the practicum with student teachers rating the involvement of the supervisors less highly than did the supervisors themselves.

Further, Schlagal (1996), states that the practicum often occurs "in isolation" and there is therefore not enough support for reflection, whilst Joyce and Showers (1983, p. 613) show that the perceptions of pre-service teachers of the teaching process, is that it is "individualistic" (p. 1). Schon (1983) asserts forcefully that the practicum is often in danger of "cutting the practicum situation to fit professional knowledge" (p. 44). With all this criticism regarding the practicum, but with an underlying belief that the practicum is necessary (May and Zimpher, 1986), the point now seems to be how to overcome these problems in order to provide the most fulfilling, satisfactory and educationally sound practicum experience for student teachers.

With the foregoing difficulties in mind the objectives of the Project were:

- to promote teaching competency development and reflective practice via the three way interaction of university supervisor, co-operating teacher and student teacher using modern communications and information management technologies, and

- to evaluate the feasibility of using an integrative instructional information management system, linking university supervisors electronically to school sites, for decision support in the exercise of supervisory practices.

METHODS

This was a cross sectional, descriptive, evaluation-research feasibilty study employing qualitative methods drawn from ethnography. The latter included logs and diaries, semi-structured interviews and unstructured observation. The data pool was augmented with anecdotal records obtained by unobtrusive measures using a facility in the IIMS to record and monitor its implementation status. Data, after transcription, were entered into the NUD.IST text analysis package and analysed using open coding procedures. This was in order to construct a taxonomy of categories leading to the search for emerging themes.

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New Information Technologies Employed in the Project

The technology base of the Project was underpinned by the use of an IIMS into which other technologies were linked to provide an integrated electronic infrastructure customised for the purposes of practicum supervision. The particular IIMS (IMSeries™) is a commercially available software system that seeks to integrate the web of relationships occurring between curriculum (including external standards and referents such as 'exit outcomes'), teaching and learning, and assessment (including student monitoring review and reporting). It is designed to integrate these, via the flow of information across organisational boundaries, with school administrative functions such as discipline and attendance, resource managemnt and scheduling. The system is readily customised to meet local requirements in a given school context and the underlying assumptions and System capabilities are delineated in Carter (1993).

> The use of a networked IIMS in an information rich environment which it engenders, enables the accumulation of shared data to be saved in the system for access by staff, students and parents. The IIMS, *when interacting with a professionally informed mind*, is capable of managing critical information at every step of the complete curriculum process, the logic of which has been incorporated into the System's design and architecture.

The IIMS was networked within the remote school and connected via a modem link to the University, so that information could be shared across both sites. Other technologies employed with the IIMS included Timbuktu (a remote machine capture file transfer software package), email and telephone. Imagery was explored via CU-Seeme for computer conferencing, and a laptop computer with QuickCam miniature camera for classroom images. The latter were used subsequently for lesson reconstruction purposes with the student teachers. Classroom images were stored in computer memory and linked to the IIMS as external files, but capable of being managed within the System.

Curriculum, lesson planning, assessment procedures, student monitoring, and student teacher self-monitoring were reviewed periodically, as data accumulated over the course of the practicum and at the end of the data collection period. The information stored in the student teachers' data bases were then analysed and the results are discussed below.

Participants

The group of four student teachers, who volunteered as subjects, were drawn from a cohort of Diploma in Education students being prepared to teach in high schools. Each had undertaken earlier extended block teaching practices in 1996. Their methods areas included Business Studies, Computing, Art and Social Studies. Three University supervisors became subjects in the areas of Art, Social Studies and Computing, and three cooperating teachers who also covered the same subject areas as the University supervisors also participated in the Project. A science teacher with a part time computer support appointment together with the Chief investigator acted as Non-particpant Observers. The four pre-service teachers, along with their university supervisors and their co-operating teachers undertook intensive training in the use of an IIMS prior to and during the practicum period. Other participants included a science teacher, with a specific technical and computer support role in the school, and the research assistant in the trial.

Procedure

The Remote Area Practicum Supervision Project was run over the course of a single semester, culminating in a six week extended teaching practice. The aim of the Project was to evaluate the potential of new information technologies and the implications of these for new ways in conducting the pre-service teacher practicum. The Project had a dual focus 1) the availability of new technologies and the rise of mass rapid communication

and how these might be utlised in the implementation of practicum supervision in a remote locale, and 2) selected problems in the practicum, alluded to above, and how these could be addressed using the convergence of a range of new information technologies.

The Chief Investigator was based at the school for the duration of the practicum and the students were also visited by the Field Experience Officer from the University. In addition to maintaining a log of events and a diary containing observations the Chief Investigator collected visual data of classroom events using a laptop computer/QuickCam combination. The classroom imagery was used for lesson reconstruction purposes and built into a portfolio for storage in the IIMS. Lesson reconstructions were emailed to University supervisors for further feedback but **not** for lesson evaluation purposes.

The student teachers were supervised remotely by the three University supervisors using modern communications and computer technologies, and directly by their cooperating teachers in the remote school making use of the available technology. Communication took place between the student teachers and their University supervisors via modem links and these were recorded using the 'Flash Note' capability in the Timbuktu software as well as evaluation commentaries stored within the IIMS using the remote machine capture capability.

Shortly after the Practicum had been completed the student teachers were asked to document their personal reflections concerning their experiences in using new information technologies in their practicum supervision, as were the university supervisors. Intensive interviewing of the pre-service teachers, the university supervisors based at the university and the cooperating teachers at the remote location was conducted.

The School Context

An independent school in a mining town in the Outback some 800kms from Perth was selected because of the Principal's prior experience with IIMS technology, and the intention of the staff to implement this across the school. Early implmentation of the System is reported in Carter, Connors and Kelly (1997). The school had a population of 380 students and 28 staff. The school experiences a high turnover of staff per year, largely as a result of its remote location (Carter, Connors and Kelly, 1997)

RESULTS AND DISCUSSION

Space does not permit the detailed presentation of a large volume of qualitative data even when it has been ordered, indexed and formed into a number of taxonomies. These are presented as a subset of the full NUD.IST index tree in Figure 1. Some selectivity in the presentation of data has been necessary, and the selections for this paper were based on the extent to which certain elements were recurrent within the data set, and exemplified patterns of thinking and/or behaviour coded under emergent themes. Themes connect different sub-systems of a culture, and one way to discover them is to look for relationships among categories in the taxonomies together with a distillation of the contents of the memos connected to various nodes as a function of the indexing process. This process of analytic induction has uncovered three themes which are:

- Social adaptations to the transfer of new information management technology
- Information-based practice as an aspect of reflective practice
- Supervision as a process of continuous dialogue referenced to shared information across the supervisory triad.

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Figure 1. Selective taxonomic represenations from NUD*IST Index Tree around the dimensions of:

A. Information Technology
    1. Systems
        (a) Communications
        (b) Packages
            (i) Using IIMS
        (c) Support
            (i) Training
                * Computer Literacy
        (d) Informating
        (e) Computer Saturated Envrionments
    2. Frustration
    3. Technology

B. Reflective Practice
    1. Reflecting
        (a) Students' Reflective Practice
        (b) Information (data based practicum)
            (i) Teacher as Student
        (c) Professional Development
            (i) Organisation

C. Supervision
    1. Supervisory Triad
        (a) Supervisory Process
        (b) Models
        (c) Remote-Area
        (d) Collegiality

Illustrative material has been included from diaries/logs and interview data as well as commentary recorded within the IIMS itself and Timbuktu flashnotes.

Inspection of the raw data clearly showed that technology, while it brings potential benefits also has a downside adding to stress and frustration when timely support is not available and the technology is not working well - or simply not working. For example, school supervisors experienced frustration in their inability to access student teacher data in a timely manner exemplified as follows:

> On a personal level I am always excited by technology so I have enjoyed the opportunity to further these skills. However, I found that I have become frustrated at times because I have not been able to use the system as much as I would have liked to as much as I would like to go and find out what is happening to the student. I would like a greater wider use of it simply by having greater access to equipment.
>
> co-op Rnd1jpc : 121-128

For one of the less computer literate student teachers it took the form of:

> My supervisor hadn't got to supervise me [yet, because] my [data] file went floating off somewhere.
>
> Students Rnd 2/96 : 73-81

and,

> I haven't had a very good time trying to print lessons because of all sorts of problems so it's nice to hear something POSITIVE! I'll chase up the e-mail later today...
>
> Timbuktu Flashnote: 9/2/56 6a.10: 26-27

In interpreting these comments it is clear that in creating computer saturated environments a measure of technology dependence ensues in which there is little room to manoeuvre when things are not working to plan. This really added to the high stress levels of student teachers on teaching practice, Thus:

> I couldn't print anything for the first time, Colin [technical support person]] was sick and off for the day and basically I had Margaret [university supervisor] coming in the next day, and I couldn't get my lesson plans printed, and that was really, really frustrating because you know someone is going to watch you, but you haven't got anything for them.
>
> Students Rnd 2/96: 27-34

Partly these comments relate to the temporary de-skilling effects of any significant innovation, partly to levels of computer literacy, to equipment unreliability and availability, and to uncertainty because of the need for further training and support. This dimension, however needs to be counterbalanced by the potential benefits that accrue through the use of the new IT. For instance,

> I think the biggest plus [is that] all the information relating to all parts of teaching will be available on the computer for you and/or students to access any time. That is a big plus.
>
> Co-op Rnd1jpc : 101-105

> You can access the program at any time on your hardware so that you can look at what the students are doing, the prac students are doing and what the students, what their plans are and their evaluation. So that is very useful...
>
> Co-op Rnd 2jpc : 8-13

With respect to the second theme to emerge, concerning reflective practice, our evidence suggests that the IIMS and related technologies used within the Project assist the process, but in a somewhat narrower form than that advocated by Donald Schon and other theorists. With the accumulation of planning and assessment data and lesson self-evaluations within the IIMS supplemented by co-operating teacher and (remote) University supervisor comments, all members of the triad can make reference to this accumulating pool of data . It eventually becomes a de facto portfolio of accumulated experiences and material resources acquired by the student teacher over the course of the practicum.

Reflective practice as represented in the literature has deep seated philosophical connotations. While contemplation of student teacher professional practice data is both necessary and rigorous in contributing to a developing critical self-awareness this tends to occur in a move towards data or information based practice which in essence is regarded as a subset of the wider concept of Reflective Practice *per se*. The form this takes is illustrated in the following comments.

> I think the most important thing about self reflection ... is that it enables you to filter information on your teaching practices. The advantages in using a system like the IIMS in this situation is that patterns can be picked up more easily using the system because the system is integrated. Self-reflection on individual lessons when placed on the computer also become a database providing information on the effectiveness of objectives, and general teaching programmes.
>
> Student round 2 : 51-68

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> I think the best thing that I get out of here is that I evaluate and learn from my own mistakes and improve on my future performance and with IIMS I think it would have to be the comments that have been put in by Joan and Don [University supervisors].
>
> Students Rnd2 2/96 : 378-387

Finally, with respect to the third theme, the evidence suggests that accumulating experiential data, now stored in the IIMS, can be contemplated and analysed at will by all members of the supervisory triad in an on-going way which is no longer temporally bound. This has implications for the nature of the supervisory cycle which is reconceptualised in terms of an on-going process of professional dialogue. This situation is reminiscent of Schlagal, Trathen and Blanton's (1996) "community of discourse", using the power equalising nature of shared data and information to guide, inform and reflect upon the developing practical knowledge and teaching skills repertoire of the beginning teacher. There are also further implications for supervisors to reflect upon their role(s) and effectiveness as supervisors, and the need to see supervision as a process of human interaction, the effectiveness of which can be augmented, but not replaced by emergent technology. This is eloquently expressed by one of the University supervisors who stated:

> I really see a lot of benefit in using this system for remote area practice supervision, the only drawback I think is the potential for supervisors at the base location to 'forget' (too strong - distance=remoteness=not thinking of them as much as those who are close) their students at the remote location and it is these students who probably need the most contact of all.... Although I think IIMS has great potential for seeing students work on-line, particularly while they are in a remote location, I still like the 'personal touch' of talking on the phone - hearing intonations and expressions in the voice. A combination of all factors would, I imagine, prove to be an effective and innovative supervision of practicum students.
>
> JPC Log

In a computer networked situation this informated environment appears to engender collegiality . This theme arose as a concept naturally within the data, from both the student teachers and the school co-operating teachers, when interviewed as members of different focus groups. This is evident in the statement made by one of the co-operating teachers in the following manner:

> First of all I think it is a real challenge to be able to access this sort of technology but also from the point of view of the interaction of all parties, especially on the email up front where we were able to access people in Perth and get instant results from people we know. Whether face-to-face or not. We were able to develop good rapport with everybody concerned because of this system. [INT. THAT IS AN INTELLECTUAL SATISFACTION] Definitely yes!
>
> Co-op Rnd2jpc : 89-104

It is noteworthy however, that the pattern of communication in the conduct of the professional discourse occurred between the student teachers and their school supervisors *in situ* , and student teachers and their University supervisors remotely. There was no evidence of any pattern of communication directly between co-operating teachers and University supervisors other than the shared access to each party's feedback and comments stored within the IIMS. This finding highlights the need for supervisor training, mentoring and development in the use of this technology to realise the ideal of three way communication adequacy across the supervisory triad.

CONCLUSIONS

In the context of this Project we now have sufficient evidence to support the view that new information management technologies, allied with modern communication technology, can substantially assist in improving both the effectiveness of practicum supervision and the quality of an emerging self-critical awareness on the part of student teachers - and their supervisors, *as supervisors,* too.

It needs to be stated that the role of technology as an amplifier of human capacities, is not to act as a surrogate for face to face human interaction within the supervisory cycle, although the capacity for this to occur lies latent in the technology. Rather, it is regarded as a set of tools which enable participants in the supervisory triad to work together collaboratively, in the interest of developing student teachers' professional skills and attributes, in ways not hitherto conceived of or deemed possible. Implicit in the use of data now captured and stored within an IIMS in a routine and substantially unobtrusive manner, is a shift in mind set towards information based practice To this end the contents of the data bases within the IIMS are the cutting edge for reflection and the sharing of experiences. Data concerning student performance, curriculum, teaching and learning can be contemplated by practitioners as they become students of their own professional practice.

It is also evident, in the rich pool of qualitative descriptive data which has been gathered at the School and the University over the course of the practicum, that new technologies bring attendant problems as well as benefits in their wake. It is a mistake for organisations to invest in new technology and not to make a similar investment in the staff who will use it. This places a premium on time for staff training and development as well as a recurrent financial cost in the purchase of equipment and its continuous upgrade. The cost of ownership of computer hardware and software has to be reconciled with the cost of ownership in this regard.

It is likely that the technology infrastructure in many schools will not be as advanced as the equipment used in Universities and by the developers of courseware and software. Thus leading edge programs will necessarily have to operate reliably, at less advanced levels of technology, if remote area supervision is to become a practical possibility. This raises the further problem of the density of the electronic infrastructure, which is much lower in Australia then it is, for instance, in the USA, and made more problematic by the demographics and geography of the country. The situation is improving quickly, however, in the light of further technological advance.

The efficient and effective use of new information technology is also fundamentally dependent on technical support and backup which has to be readily available in a timely fashion. If it is not, then technology dependence rapidly becomes a health hazard. Anecdotal evidence suggests that for many schools this is becoming a major issue affecting technology transfer.

Finally, we now have evidence to show that new IT when applied appropriately can support the development of more collegially based practices and the sharing of practical knowledge and wisdom which enriches the process of education. The caveat, however is that, unless we concurrently attend to the deepening of vision and ensure that these systems are well understood, it is unlikely that fundamental changes will occur regardless of the technologies in place.

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